THE RECOVERY KERNEL

Seri ya referansi y'ubumenyi bwa neuroscience.

ΔFosB

IMOLEKULI Y'IMISHYENGORO.

Ibijyanye n'uburyo byifashishwa, ubuzima, ibizamini, n'igihe byatuma ibintu bikemuka — Gutangaza kwa Kabiri.

⚠ IBIHERO BYAGUHANWA MU KUZITIRA UBUVUKE N'AMAHORO, BIDASIGARAHO INAMA YIWE MU BYABAZA BYA MEDISINI CYANE.

Igitero: mwitwarize 912 cyangwa usende findahelpline.com.

Ibiganiro bitangira.

Iyi ni edition ya kabiri y'iyi guide, yagutseho amabwiriza menshi ku by'ubumenyi bwa molekuli, ubushakashatsi bw'ubuzima butanga ibimenyetso ku byo gutuma ΔFosB kuba burambye (ahubwo, aho kugira ubushakashatsi bw'ubuzima bwa gene buciriritse butangwa n'ibigo by'ubuzima by'ibikorwa by'ubwivuza, kandi abantu benshi bashobora gukora), umwirongo ku byo gushakira mu by'ubuzima bwa DNA n'ubushakashatsi bwa epigenetiki, n'ibyo bitanga kandi ibyo bitanga. Hari kandi ibibazo bibiri by'ingenzi byajya mu byumvikanwa mu bice byo guhuza abantu: kuki gukoresha imiti y'imikoko y'imiti itandukanye bigatuma kugaruka ku buzima busanzwe bikaba bigoye cyane, kandi kuki kugira ibihe byo kwitera imbere, hanyuma ukongera gukora, bigatuma ukongera gukora ibyo wari witeguye gukora, bigatwara igihe gito cyane.

Ibyo bisanzwe by'edizione ya mbere bikoroshye: ΔFosB ntibigeze byumvikwa neza mu ubwonko bw'umuntu w'umuntu. Ibyo byose ku birebana no kuba byiyongera no kuba byagira ingaruka, byaturikiwe mu bushakashatsi ku byinshi ku by'inyamaswa, mu byemezo by'ubugeni, no mu bushakashatsi bwa muntu ku bipfunywa. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni iby'ingenzi, kandi byumvikwa neza. Igihe cyo mu buzima bw'abantu ni

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Ibyimenyazo.

Ibyo bishobora gukoreshwa mu bindi bisigazwa byo mu "Recovery Kernel" ni ibyo nyene.

- YEMEZWA - amabwiriza meze, yagaragaye inshuro zirenze, kandi abantu benshi bayumvikana (cyane cyane ubushakashatsi bugaragaza ko bishoboka ku bipfu, cyane cyane ku ΔFosB; kandi ubushakashatsi bugaragaza ko bishoboka ku bantu, iyo bigaragariwe).
- INYITIMBO — amakuru agaragaza ko hari ibintu byimbitse cyangwa ibimenyesha bigaragaza ko bigendereye uwo mwari.
- IMENDEGERWA – bishoboka, ku rwego rwo gutangira, kandi itaravugwa n'abantu bose.
- IMIBARAGA YA UMUSHAKAMIZI/UMUSEBENEYI - ni gahunda yakoreshejwe mu kuvuga ibintu by'ingenzi muri iyi porogaramu; bityo ushobora kuyireba nk'iteka, ntukayirebe nk'ikintu gishoborwa.
- CONTROVERSIAL/MIXED — hari impaka zikomeye mu bushakashatsi.
- NOT ESTABLISHED — yajyaho ibibazo, ariko nta bimenyetso by'impamvu z'ibyabaye.

1. Ibiranga by'ΔFosB - Uburyo, mu Mana

[YEMERWE] (imigize; uburyo bw'iyi gahunda bamenyekanye neza mu bushakashatsi bw'ubuzima bw'abantu kuva mu byiciro by'ubuvumbuzi bw'ubwonotsi, kandi by'umwihariko mu byakozwe n'itsinda rya Eric Nestler).

ΔFosB ni umwimerere ushobora kugaragara mu gene ya FOSB, kandi ifunganya nk'umufungurira - umutope ushobora kuvuga ko gene zindi zigomba gukora cyangwa ntizikore - kandi usanzwe mu ma zone ya nucleus accumbens, dorsal striatum, na hippocampal dentate gyrus. Impamvu itangira kwiyongera aho kugira ngo yongere kandi yongere inshyashya nyuma y'amakuru y'ubwa mbere, ni ukubera ibikorwa bibiri by'ibimenyiste byifashishijwe:

- Ubuvuguzi bw'amaso busenya urubyabo rwo ku muso. Muri iyo myanya y'igihe, umushinga w'ibyiyongera (uguruka ku ivugwa ry'umwirondoro D1, umuhandekwe wa Activin/ALK4, n'umuryango w'ibinyobwa SMAD3–PCBP1) utuma umwimerere wa pre-mRNA wa FOSB ushyirwaho mu buryo butandukanye n'ubwo usanzwe. Ibyo byiyongera bituma umunyobwa wa ΔFosB utangira, kandi uwo munyobwa udafite uruziti rwo ku kiboko (C-terminal) ko umunyobwa w'igice kinini wa FosB yifashisha kugira ngo yemerwe kugwa vuba n'ubusobanuro bwa ubiquitin-proteasome. Uretse urwo ruziti, ΔFosB urushaho kuramba kurusha umunyobwa we, ariko kandi urushaho kugwa mu buryo butaziguye muri iyo myanya.
- Phosphorylation yica umwirondo. Casein Kinase 2 (CK2), enzime itangiza neza mu maseli ya ubwonotewe, yongera atomi ya phosphate ku poroteyine yitwa Serine 27, iri hafi y'ibice by'imbere bya poroteyine ya ΔFosB. Ibi bihindura ishusho y'iyi poroteyine, bigatuma itazongorwa n'ibindi bintu byayishoboraga kuyihindura. Iyi poroteyine yongerewe atomi ya phosphate ni iyo ituma kuba ishyushye, ifite uburemere bwa 35–37 kDa, kandi ni iyo itangwa neza igihe umuntu yakoresha imiti uko uko kose, kandi irushaho kuguma kera nyuma y'uko umuntu yari yarayakoresheje rimwe.

Ibiranga bigaragara mu rutabaro ruri hasi bisobanura uko ibyo bitandukanye bigira ingaruka.

Isoform.	Massa y'ubushake.	Iyi ntambara yaba iyi uko.	Ibyiciro byo guhinduka.	Kwihangana.
Full-length FosB.	~50 kDa	Yagumanye neza ibice bibiri by'inyuma z'amajini (C-terminal degron domains).	Ubikitinasyon na ikoreshwa n'ibiyindi byitwa "proteasome" ku bisigazwa by'imodoka z'amashusho ziri ku kiboko.	Buryajya - amasaha
ΔFosB itarenagizwe intasi.	~33 kDa	Splitting amakuru mu exon-4/intron-4 yivanamo amagambo agororoshye ari mu ntungo z'amajini, ariko Ser27 itarashyirwaho umuti.	Ubukoranyi bw'intubike z'amaseli binyuze mu ntembero y'umutwe ushobora kugaragara.	Moderate — hours to roughly a day
ΔFosB ifosforiyizwe ("igaragazwa").	~35–37 kDa	Casein Kinase 2 (CK2) iforogera Ser27, bikahindura isura y'iyi poroteyini, bikaba bigabanya ibindi bintu byatuma ivaho.	Uruhwira rukoresha ubushake bwo gukurikiza ubushoborero bwo gukurwa n'ubushake bwo gukurikiza ubushoborero bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo	Bishoboka ko umuntu uyifumira akenshi, igipimo cyayo gishobora kuzamuka mu gihe cy'ibyuminsi byinshi, kandi bigomba kugaragara mu

Isoform.	Massa y'ubushake.	Iyi ntambara yaba iyi uko.	Ibyiciro byo guhinduka.	Kwihangana.
			gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo	gihe cy'ibyuminsi byinshi cyangwa ibyuminsi bike nyuma yo kwitaba.

Isoform.	Massa y'ubushake.	Iyi ntambara yaba iyi uko.	Ibyiciro byo guhinduka.	Kwihangana.
			gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo	

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			gukurwa n'ubushake bwo gukurwa n'ubushake bwo	

Isoform.	Massa y'ubushake.	Iyi ntambara yaba iyi uko.	Ibyiciro byo guhinduka.	Kwihangana.
			gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo gukurwa n'ubushake bwo	

Isoform.	Massa y'ubushake.	Iyi ntambara yaba iyi uko.	Ibyiciro byo guhinduka.	Kwihangana.
			gukurwa n'ubushake bwo gukurwa n	

Ibijyanye n'ibyo: ΔFosB itanga ntikuboneke kwinshi kuko byinshi byakongerwa - transcriptions ya mRNA zigabanuka vuba nyuma y'uko umwuka utangirwa. Iyo itanga, nyuma yo gufashwa, itatwa ku buryo busanzwe. Ubuvumbuzi, ku rwego rwa molekuli, ni cyane cyane urugendo rwo kwirengera umwanya umwihano ufatwa nk'uwubatse kugira ngo utatwe vuba.

2. Indukwa ya FosB mu ishami rishinzwe ubuhanga bwo gufasha abantu kwirinda no guhagarika imiryango (Recovery Kernel) ku rutonde rw'ibintu.

"Induction yaherindwe" ireba imbaraga z'umushinga wa dopamine, ubushobozi bwo gutangira kugira ingaruka, no guhererekanywa kwinshi - ibyo ni ibintu bitatu by'ingenzi by'uko ΔFosB igwira mu buvuzi bw'inyamaswa.

Ibiribazo by'inyangamvugo / Imikorere	Uburyo bw'ingenzi buhereza mu ΔFosB.	Induction y'umwimerere.	Ibuze.
Amavuta.	Ibyo bishobora gutuma umuntu agira ibimenyesha by'umwani no gutakaza ubwenge.	Moderate–yikubye mu gihego (igice/uburyo bwo gukoresha bishobora kuba bitandukanye).	GUSHINGIYE (ubwoko bw'inyamaswa)
Cocaine	Gukangurira ibintu byimbitse; amagararano meza kandi asa.	High.	KWEMYE.
Kokayini.	Iyo umushinga ukora nk'uko cocaine ikora, kandi igihe cyo kugira ingaruka ni amasheke make (minuta 8).	Igihe gito cyane - igihe cy'ibanze cyo gutangira gukurikizwa ni igihe gito, kandi bituma igikorwa kiza kwinagura vuba.	KWEMYE.
Methamphetamine	DAT/NET reversal — guverana ya dopamine, ntihubahirwa gusa.	Cyinshi cyane.	KWEMYE.
MDMA	Kwiyongera gikomeye cy'iserotonine ndetse no kwiyongera kukoze cy'adopamine.	Moderate (ubwonosi bwo mu bwonko buterwa inkomehamug aragaza ko ukwiye guhagarika gukoresha icyarimwe).	POSIBALE
Nicotine.	Kwihindurura kw'amarebashya ya nicotine bitera uburyo bwo gufata ibindi bimenyiste ku buryo bwinshi (10-20 inshuro ku munsi).	Umunyabuzi ukomeye uhindura ibintu bidatanga umusaruro munini buri nshuro.	KWEMYE.

Ibiribazo by'inyangamvugo / Imikorere	Uburyo bw'ingenzi buhereza mu ΔFosB.	Induction y'umwimerere.	Ibuze.
Heroin / imiti itanga umusaruro y'ubuzima (opioids)	Mu-opioid receptor activation ituma neuron ze dopamine zo mu VTA.	Moderate–High	GUSHINGIYE (ubwoko bw'inyamaswa)
Fentanyl.	Iyo ni uko ifeza ifite umuhanda umwe nk'uwa heroin, ariko ifite ubushoborero bwinshi cyane kandi itangira gukurikira vuba.	High.	POSIBALE
Benzodiazepines.	GABA-A potentiation; kwihanagizwa kwa dopamine ku buryo bwo guhagarara.	Nini - Buhanga bukeya.	KUBUKA.
Ibiribati (THC)	CB1 activation ituma neuron z'amashereka za dopamine ziba mu VTA zongere ireme.	Nini - Buhanga bukeya.	KUBUKA.
Ketamine.	NMDA antagonism; ingaruka ku dopamine z'imodoka z'umutungo z'ibintu z'ibindi bimenyebweho.	Nini - Buhanga bukeya.	KUBUKA.
GHB	GABA-B agonism; ingaruka z'idopamine zigaragazwa ku buryo butandukanye kandi bifite ibice bibiri.	Nini - Buhanga bukeya.	KUBUKA.
Kratom	Imyirondoro y'ubwonkora y'imikundiro y'opioïdes, igihe igaragazwa mu dozi zikomeye.	Nini - hagati (bishingiye ku ngufu).	KUBUKA.
Mephedrone (4-MMC)	Umushingira w'ibintu byinshi bifatwa n'amaso, birimo DAT, NET na SERT, bitanga umucamanuka, kandi bifite imikundikuzo nk'iy'umutware, ariko bigira imikundikuzo itoya.	High — ubuzima bugufi bwo gukora butuma hakenerwa gufasha uko bushoboka.	KUBUKA.
Methedrone (bk-PMMA / 4-MeO-methcathinone)	Iyi kimwezo ifite ishusho y'umwimerere y'impimpa; ni umutungo ufite ubushoboro bwo gukangira SERT cyane, kandi ufite ubushoboro buke bwo gukangira DAT.	Moderate–High — ifite ingufu nke ituma umwani w'udopamine ukenewe n'ibindi binyobwa nk'umephedrone, ariko umusaruro w'ibimenyetso ushanduka uko giheruka gukoreshwa ni wo ushobora kuba uko uko.	UBUSHOBORO BW'UMUSORE/UMUSESERU - byavuye ku cyiciro cya cathinone, nta gahunda y'uburere itanga.
Imikino y'amahirwe / imikino / izindi nshinga z'imibereho.	Iyo rwanda rimeze nk'aho, ariko ryatemberwa n'uburyo bwo gukora ibintu butandukanye, aho ntihagereho molecule.	Moderate–yikomeye, n'ubusabukomeza buhagaze.	IVUGUTISHIJWE (imikundiro y'ibyumba, ibikoresho by'ubugingo).
Ibiryo bifatwa	Kwivanga mu biryo byinshi bifite	Moderate	POSIBULE

Ibiribazo by'inyangamvugo / Imikorere	Uburyo bw'ingenzi buhereza mu ΔFosB.	Induction y'umwimerere.	Ibuze.
nk'ibyo bifite ubwiza bw'umunyururu / isukari.	isukari nyinshi na mazi atuma umubiri utera umweru, bigira ingaruka nk'iz'inyanga, bigatuma umwihano ushobora kugaragara mu buryo bwo gukora ibintu bitandukanye mu buryo bwo gukora ibintu mu buryo bwo gukora ibintu.		

Methedrone ntigeze ibanza kuba ikibazo gikubiye mu bushakashatsi bugize ΔFosB; irebwa kuva ku ishyaka ryayo ryo mu cyici cya cathinone, bidasanzwe ku bushoboro bw'ibimenyetso by'ubugenge.

3. Igihe cyo guhuza ibintu - Ibyo ama data agaragaza.

Nta igihe cy'ubuzima bw'umuntu kuva ΔFosB yemejweho ku buryo buvuguruza, kandi byatangajwe mu muntu w'umubiri. Igihe cyose gihereye kuri ibyo gihereye mu mazi ya nyamaswa cyangwa ku bushakashatsi bw'abantu bake byakozwe ku baguye. Mwirinde kubyifuzaho nk'igihe cy'ubuzima bwanyu bw'umuntu.

Igihe.	Ntamenye.	Igihe gikorerwa.	Ibuze.
Kwiyongera k'ubwa muganga.	ΔFosB itaratunganyijwe yigaragara nyuma y'amasegonda mashya; igorwa vuba, kandi cyane cyane ivaho.	Ibihe bigera ku munsi umwe.	KWEMYE.
Kwiyongera.	Gukongera umwimerere bituma ΔFosB, ituma CK2 ifungurwa, kandi itifite ibintu bituma ivaho, kugira ngo itazazimwa n'ibindi bimenyweho kuvura ibyore. Ibi bituma ΔFosB irushaho.	Iterwa mu minsi cyangwa ibyuminsi, hagendera ku myumvire itangwa.	GUSHINGIYE (ubwoko bw'inyamaswa)
Akumulasi gikomeye.	Gukomeza gukoresha burundu bigabanyuma bigabanyuma birushaho kwiyongera mu byo ushobora gukoresha neza, kudasinzwe no kuba byataye agaciro.	Ibigana by'amapfa akoreshwa uko ari bwinshi (kuva ku cyumweru kimwe kugeza ku cyumweru kinani cyangwa cyane kurushaho); bishyirwamwo igipimo/uburyo bwo gukoresha.	Zigera kuba (ubwoko bw'ubuki, bigenda kwinagura bitewe n'igisase).
Kwita umurongo wa mRNA nyuma y'iyo mvandimwe ya nyuma.	Ibyo bituma ibimenyetso by'uburwayi biza gutangira kugaruka mu munsi umwe nyuma yo kwitera. Kuko nta proteine nshya itangirwa gukorwa.	Ama saa 24-48.	IZINA RISANZWE (ku myumburuko)
Kwipfuka protein.	ΔFosB y'icy'imideri cyihariye itangwa, itazamo mu buryo buhagaze, ihinduka buhoraho mu gice cyitwa "nucleus accumbens" n'ahandi bitwa "striatum", kandi uko uko kwihindura kw'iyi poroteyine kwarahagarikiwe.	Iminsi itangira ukwezi kimwe kugeza ukwezi kimwe cy'amezi, mu byibushobye	INYITIMBO (uburaya bw'umutungo, hamwe no gutanga

Igihe.	Ntamenye.	Igihe gikorerwa.	Ibuze.
		byakozwe ku byinshi. Byagaragaye mu mibiri y'abantu nyuma yo kwizimana, amaze iminsi, kandi byerekanira ubuziranenge bw'ubuzima.	amakuru ku muntu nyuma yo kwizimana).
Ubukiranizi / kuguma kw'ibintu byubuse.	Ibyago by'inyamaswa z'umuhogo no guhinduka kw'ubusobanuro bwa DNA (rebere Icyiciro cya 4) birunga igihe nyuma y'aho iyo poroteyine itakiba.	Ashobora kurenga ibyuminsi byinshi, kugeza igihe umubare wa ΔFosB utaba ushobora kurebwa mu byiciro by'inyamaswa.	KUBUKA.

Ubwumvikane buvugwa: Ubuhererekano bukomeye bw'umushinga wa protini ihuza ΔFosB burashobora kuba mu minsi ya mbere nyuma yo guhagarika umushinga. Ariko - kandi iki ni icyiciro cy'ibitekerezo byinshi bitanga - gukwirigita ibyuma ntibishobora kuba nk'ubuguruzi bw'amashyirahamwe. Ubu buhuha ni icyiciro cy'ikibazo cy'agace gikurikira, kandi bicye cyane bitandukanye n'ibindi byinshi mu itorero riri hano.

4. Ibirungo by'amashini byaguma nyuma y'amashini.

[YEMEZANWE] (imigize y'ibyumba).

N'igihe ΔFosB iriho, ntihagere gusa mu nukleasi—ihuriza inyongera y'ibintu by'umushinga (machinery) yo guhindura chromatin ku bice by'ibindi bimenywe, kandi iyo nyongera y'ibintu by'umushinga yashyira ibimenyetso by'igihe kirekire, kandi byagera ku bice by'ibindi bimenywe, kuko byagera n'igihe ΔFosB itarongeraho.

- Ku gene zimwe, nka c-fos, ΔFosB yifitanya n'ibice bya AP-1 ku buryo bwo gushyira ku gice cy'inyamaswa (promoter) kandi yunganira Histone Deacetylase 1 (HDAC1). HDAC1 irangiza amagaramu ya asetili ku ma-tail ya histone ari hafi (H3K9), maze ivanga urwo ruganda rwo muri DNA, rukaba heterochromatin. Gene irushaho kuba intibugoye gushyirwaho amashyirahamwe, kandi uwo mushyirahe urakomeza kugeza igihe protein ya ΔFosB yaba yarahindutse.
- Ku gene, ivuga:
  * CDK5
  * Subunit ya AMPA, GluA2 (GRIA2)
  * ARC

  ΔFosB itwara BRG1, urwego rushinzwe gukora mu murongo wa SWI/SNF ushyiraho ibice by'amashyirahamwe. BRG1 ifungura ibice by'amashyirahamwe ku buryo bwa gene, kandi ibyemerwa n'ibimenyetso ni ukwiyongera ku buryo bweruye ku bice by'amashyirahamwe ku myinota y'amahembe

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Iyi ni impamvu y'ibyabaye, kandi abantu bari mu byaha bamenya neza: intambara itazatwa burundu kuko ubushake bwa kera bwahagaritswe kandi iproteine yatumye butegeka itangiye gupfuka. Umwihugu w'ubwonotewe urahindutse— byinshi byiyongereye, ibindi byahindutse, kandi hari ishusho itandukanye y'ibice by'imizinga ku bice by'ibindi bimenyetso— kandi ubu buryo bwo guhinduka ni bwo butuma ibintu byongera gutwara igihe kugira ngo byongere. Ni kandi icyo gituma ibice 8 na 10 zivugwa hasi.

5. Ibyifashisha – Ibyo bituma ibintu biguma ku mwanya no iby'ibindi bituma bigenda bigenda.

Buri kintu mu Ngabane ya 2 birenga ubushake bwo gufasha ΔFosB kwiyongera, binyuze mu isiganayo y'ibyimenyureshwa - iyongera no kugabanuka byihuse, bigatangwaho. "Abigenga," mu nshinga zikoreshwagaho hano, ni imiti n'ibindi bitumvikana by'ibinyabuzi bifasha guhagarika iyo gahunda y'iyongera no kugabanuka, cyangwa se bigateza imbere ibindi bimenyabuzi bifitanye isano, bidahagarika uburyo bw'ubugabo buvugwa. Nta kintu muri iyi gahunda kirenga uburyo bwo gufasha ΔFosB kwiyongera - nta kintu muri iyi gahunda kirenga uburyo bwo gukora ibyo byo vuba. Ibyo byaba bishoborwa ni ukugabanya uburyo bwo kwiyongera, cyangwa kugabanya ingaruka z'ibindi bimenyabuzi (ubugabo/synthesis ya GABA, imikorere y'intunganyiganda ivuyemo methylation) kugira ngo zitazongera umutwaro mu gihe cyo gukira.

Imiti y'uburwayi bwa psychiatric — Ibyo birebana n'uburyo bwa ΔFosB, kandi ibyo bitarebyerebana.

Hari ibimenyetso by'intambura by'ubutware bw'ubuhanga bishobora kugira imikorere nk'iy'ibindi bisanzwe byaregeranyijwe mu itabare ya 2, kandi icyo twakwiza ni ukubyitondera, kuko si icyo gishobora kuvugwa mu magambo make, ahubwo ni icyiciro.

Icyiciro cy'imiti.	Uburyo bumwe nk'ubwa.	ΔFosB Relevance	Ibuze.
Imiti itanga umusaruro (cyane imiti ya mbere itangiza D2, nka haloperidol).	Si umushinga wa 2, ariko gukoresha cyane ibintu byatuma DRD2 itege nke bishobora gutuma umwihano wa striatum ugenda mu buryo budasanzwe.	Gukoresha imiti mu gihe kirekire bituma hashingwa biba burundu, birimo complexes za AP-1 zikoresha ΔFosB, mu isukari ya nyamaswa. Ibi bishobora kugira icyo bihuriye n'ubyimbuzi bwinshi (tardive dyskinesia), uburyo bwo gukora ibintu mu gihe kirekire, ariko bifite ibyihariye.	ZIZI.
Imiti itanga ubushobozi (methylphenidate, ampfhetamini).	Iyo gahunda ifite uburyo bwo gukora butumikanye nk'ubwo bw'amasanamu y'urumogi yitwa methamphetamine (Ingingo ya 2).	Ibinyiruko bifatwa mu buryo bwa kimyirebi - ariko igiciro cyo gufasha (kigenda neza, cyangwa se kigenda buvuye buvuye, kimwe cyangwa bibiri) kigaragaza ko bidatanga ibyago by'amabere bituma umubiri utangira gukora ibintu by'umwihariko. Ibihombo by'ukuri, igihe byakorwa mu buryo butumvikanye, birashoboka ko	IMENDEGERWA - gahunda y'uburyo, igiciyeho kitaragwizwa neza.

Icyiciro cy'imiti.	Uburyo bumwe nk'ubwa.	ΔFosB Relevance	Ibuze.
		bihagarika, ariko si iby'umutuzo.	
Itera ry'ubugingo (methadone, buprenorphine).	Ifite umwiharuro umwe na heroin.	Iyi ni imvugo y'ubuzima y'ingenzi y'ijambo "stabilizer": igihe kirekire cy'ubuzima n'uburyo bwo gufata imiti buri kanya bigamije guhagarika isekonderi ya "peak-trough" yagira ingaruka zo gufata imiti byinshi. Iyi ni impamvu ikomeye kuko OAT (Opioid Agonist Therapy) ni inzira yemejwe kandi ifite ibimenyetso, ituma umuntu atazongera gukoresha ibiyobyobye, aho kuba umuntu akomeza gukoresha ibiyobyobye.	INYITIMBO - impamvu zigaragazwa, urwibutso rwemejwe n'ubuvuzi.
Benzodiazepines (zifashishijwe, ku ngengo y'igihe)	Iyo gahunda ya GABA-A yagaragaye ko ifite irebwa rito cyangwa hagati mu gitabo cya kabiri.	Gukoresha ibintu by'umwihariko kuva kera bitera guhungwa mu mubiri kandi bigatuma bikaba bigoye guhinduka — ariko ibyo byinshi byakozwe mu buryo butandukanye, bigaragara ko bituruka ku kuba receptor za GABA-A zivuyeho/zigera ku bwinshi, aho bituruka ku kuba ΔFosB zivuyeho cyangwa zigera ku bwinshi.	KUBUKA.
SSRIs / SNRIs	Si umushinga wa burundu bwa kabiri — inziza cyangwa kwihanganira ibintu by'umutuzo/iby'umwijima.	Gukoresha imiti itangiza ubuzima mu gihe kirekire bishobora gutuma habaho ibyitwa ΔFosB mu byiciro by'ubwonkere mu nyamaswa, ariko si mu gice cyitwa "nucleus accumbens", ahubwo mu gice cyitwa "hippocampus" na "frontal cortex". Ibi bishobora kugira icyo bitanga mu kuvura no guhindura imyitwarire y'ubwonkere. Ibi bishobora kuba bifitanye isano n'uburyo bw'imikorere butanga ubuzima, bugereranyije n'ubwo butangwa no gukora imyitozo (Section 12), aho kugira icyo gishingiye ku "pathway" y'ubuzima. Hariho ibimenyetso by'ibibazo byagaragarira igihe umuntu atangira guhagarika gukoresha iyi miti, ariko ibi bibibazo biterwa n'uburyo bishobora guhindura imyitwarire y'ibice by'ubwonkere, bidaterwa n'ibintu byakozwe mu gice cyitwa "nucleus accumbens" no gutanga ΔFosB.	KUBUKA (inyangamimerere); KWEMERWA (ibimenyetso byo guhagarika bifite ibihano, uburyo butandukanye)

Nta na none yo gutuma umuntu agumana umuti ushobora kumufasha mu by'ubuzima bwe, kandi si inama y'abaganga gukora ibyo. Imiti itanga imbaraga, imiti itanga ubushobozi, iterapi ya opioid, imiti itanga ubwoba, n'imiti itanga imbaraga zo guhumeka, zose zifite ingaruka zikomeye, kandi zigaragazwa neza, zishobora kuba zikomeye. Ibyo byose birashoboka, icyaba cyaba, niba ΔFosB itari ikimenyetso. Ibyo byose birashoboka, icyaba cyaba, niba ΔFosB itari ikimenyetso. Ibyo byose birashoboka, icyaba cyaba, niba ΔFosB itari ikimenyetso. Ibyo byose

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Ibyakorwa by'intungundugu.

Aho ntacyakozwe ku byo gutanga ibyariya bitatu byakorewe ku ΔFosB. Zose zifite uruhare rukomeye mu byo bituma ibindi bikorera mu byiciro by'ubuzima, kandi zigaragaza uruhare mu gukora dopamine na GABA, ndetse no mu gukora ibintu bifatwa nk'amabere bituma MTHFR na MAOA zigera ku nshuro zikwiye (Ingingo ya 6, Umwimerere wa 4), nta ko zigaragazwa ko zishobora gufasha mu kwirinda ΔFosB.

Inganzo.	Uruhwira ruzwi.	Plausible Link to ΔFosB
P5P (Pyridoxal-5'-Phosphate — vitamini B6 ihereye)	Ibyo bishobora kugira uruhare mu gukora dopamine n'ibindi. Vitamin B6 ni ikimenyetso gikomeye cyo gukora dopamine na GABA.	Ubwukana bwinshi bwo gukora dopamine bushobora, by'umwihariko, gutuma umwirikane mwinshi w'impungye ugitanga ku ishusho ya D1/PKA/CREB itangiza ubwandikirizo bwa FOSB (Ingingo ya 6, Urwego rwa 3) - kandi iki ni impamvu y'ibintu by'umvugizi, itandukanye n'ibintu by'umutungo, kandi ntibimwe mu byo byagaragariye. [INYITERO, itangaza]
R5P (Riboflavin-5'-Phosphate — active B2 / FMN)	Ibirungo bifasha ibimenzi by'intunguru, birimo MTHFR (cyane cyane bifite ikiguzi gikubiye muri C677T, kuko igimenzi cyabo gikora neza cyane mu mazi kandi gikenera FAD) na MAOA.	Amaberegero abiri atandukanye kuva ku ΔFosB - uko umuntu afite riboflavin bigira ingaruka ku buryo MTHFR na MAOA zifata, kandi iyo gene ziba zifite gusa ubusobanuro bwo kuba zifite ingaruka ku ΔFosB (Icyiciro cya 6, Icyiciro cya 4). [INYITERO, bwite]
Calcium Glycinate.	Bitega glycine (umwirikore wa neyurotransimita kandi umufungurira wa NMDA). Igitubuturo cy'ikasiya gituruka ku bipimo bya NMDA na voltage-gated bituma CaMKII itangira.	CaMKII ni kinase itandukanye n'ikindi gishizwe cyitwa CK2, kikaba kyo kirekuye ΔFosB ku buryo bwa Ser27 (Ingingo ya 1) kandi kirekuye buri gihe, bidasanzwe ko kirekuye kuko byakozwe no kubura ibimenyiste. Ntihagira icyerekezo gikomeye cy'uburyo byakemurwa by'umwihariko ku birebana no gukomeza ubuzima bwa ΔFosB. [NTIBYEMEZWA]

Iyi mikorere itanga ibisubizo ku buvuzi bw'ubwonkawu bw'ubwonko, kandi biratanga ibisubizo buri wese, nta ko byaba byerekeye uko umuntu yagiye akoresha ibiyobyobye. Ibi bintu biratanga ibisubizo kuko dopamine, GABA, n'ibindi bimenyiste by'ubwonko bifite akamaro, kandi bifite akamaro n'ubwo umuntu yaba yaravuye mu buryo bwo gukoresha ibiyobyobye.

6. Ubuziranenge n'Ubwumvikane - Ibihanga Bine by'Ubwiyandanye.

Ibyo birebana n'uburyo ibindi bisobanuro by'ubuzima (ΔFosB) byimuka mu mubiri bigereranywa mu mirongo ine, ukurikije uburyo bwa porotegeni, guhera ku byo bifite ibimenyetso byinshi kugeza ku byo bifite ibimenyetso bike. Ibyo birebana n'urwego umwanzuro umwe urimo, kuko ibimenyetso byinshi bigaragazwa n'imikorere y'ibindi bisobanuro by'ubuzima (genes) abantu batagira mu mubiri, kandi nta nyishyuza y'ubuvuzi itanga ubu kuri iyo mikorere. Mu gihe, ibindi bisobanuro by'ubuzima (genes) abantu bashobora gushakijwe, biruri kure y'iyo mikorere.

Levelo 1 — Gutandukayo Zirimwo, Zitegurwa Mu Gene FOSB Yenyine.

Iyi ni umubwirwaruhanga ukomeye cyane mu bintu byose, kandi uravuye ku bushakashatsi bw'ubuteknologie bwo guhererekanya igene mu binyoni, bigakorerwa mu buryo bw'ubutware bw'igikoresho cy'ubuteknologie, bigakorerwa mu ntongoro y'ubwonko yitwa "nucleus accumbens" - bidaturutse ku mpinduka z'igikoresho ziba mu muntu.

Variant	Iyi porogaramu ifite inshyirahamwe.	Ingombwa ku kuruhuka.	Ibuze.
FOSB Ser27Ala (S27A)	Ubuvugizi bwa mutation bumwe, bugahindura serine mu alanine ku mwanya wa 27 — CK2 ntibishobora gufata alanine ngo ikore phosphorylation.	Ibyatanga: * Bishobora guhagarika neza phosphorylation ituma ibintu biguma uko. Mu byemezo by'ubushakashatsi byo gukoresha ibintu bituruka ku mvanga, ubwo bwemezo bwagombaga kugera mu gice cyitwa "nucleus accumbens", hanyuma umushinga wa ΔFosB ukagera ku musaruro vuba kandi kugira ngo ibyiyongera by'imikorere by'umuntu by'igihe kirekire bikagera ku mwihariko, byatangiye kugabanuka.	GUSHINGIJWE (ubwoko bw'inyamaswa, byubashijwe).
FOSB Ser27Glu (S27E) — phosphomimétique.	Byimbuza serine n'amazi ya glutamic acid, byongera igiciro cy'umwirondoro gikoreshejwe n'ibindi bimenyebwezo, - proteino igaragaza ko yarafosforwe burundu.	Iyongera umwimerere mwima nta ko yakenera CK2. Iterambuka ry'umwimerere rikomeza kandi irebwa n'imikorere itandukayo.	GUSHINGIJWE (ubwoko bw'inyamaswa, byubashijwe).
FOSB exon-4/intron-4 splice-site variants.	Guhindura umwimerere wa PCBP1/SMAD3 ushyira hamwe, uwo ushyira hamwe uhuza ibice by'informashini zikongera gukorwaho.	Ibyo birushaho gukora ubushake bwo gukora FosB yuzuye ituma itazayitwika, kandi iyo FosB yuzuye ituma itazayitwika, igenda igorwa vuba. Iyo FosB itazayitwika, itazayitwika, igenda igorwa vuba.	(ubwoko bw'inyamaswa)

Tier 2 — Ibyitse byitwaye mu ishyirahamwe ry'ubushoborero.

Izi geni zivuga ibintu bituma imashini zikora ibintu (enzymes) n'ibindi bituma ibice by'ibintu byiyongera (splicing-complex proteins) zishyireho ingaruka ku bintu bitwa ΔFosB. Uburyo abantu batandukanye bafite muri iyi geni bushobora kugira ingaruka, ariko ntibigeze ebyemeza neza ko byagira ingaruka ku bwinshi bwa ΔFosB mu bantu, ahubwo byakemurwa gusa n'uburyo byakora.

Jeni.	Fonction.	Ingombwa ku kuruhuka.	Ibuze.
CSNK2A1 / CSNK2B (ububiri bwo gukora ne ububiri bwo gutunganya bya CK2).	Encode kinase yifungura ΔFosB ku Ser27.	Ibuvuzi bishobora gufasha abantu kwirinda no guhangana n'izindi ngaruka.	ZIZIYE (ubwoko bw'ubuki, ubushakashatsi).
PCBP1 / SMAD3	Hafashe ibikorwa by'ubwonko by'ingenzi, birimo gukora neza ubwonko, gukura, no kwigira.	Amabara atangiza ibisubizo by'umubiri atanga, bigahindura ibintu byakozwe, bigatuma	ZIZIYE (ubwoko bw'ubuki,

Jeni.	Fonction.	Ingombwa ku kuruhuka.	Ibuze.
		umubiri ukora FosB w'uburebure bwose, bigabanyije ibintu byakozwe bigatuma ΔFosB itanga ibisubizo by'umubiri.	ubworozi)
ACVR1B (receptoro ya ALK4)	Receptor yubanza y'ikimenyabuzi SMAD3/PCBP1, itangirwa imirimo nyuma y'isanamu ya dopamine D1.	Imimerere y'isanamu ituma umwiharuro ukomeza kugabanuka, kandi uwo mwiharuro usanzwe utuma ΔFosB igabanuka - kandi ΔFosB ni ikintu cy'ingenzi mu nzira y'isanamu.	KUBUKA (ubwoko bw'inyamas wa, ubwiyandan ye).

Tier 3 — Gene z'ubusobanuro bwa neurotransmitter zikorerwa mu bipimo byo hejuru.

Izi ni ibisubizo by'ubushakashatsi ku by'ubuzima bw'abantu, byagaragaje ko hari ishingiro, ariko ibikorwa byabishakijwe byatungujwe ku bintu bitandukanye, nk'ububiri bw'umuntu, igihe cyo guhagarara, cyangwa ubushobozi bwo gukora ibintu. Iyo usomera "ishyirahamwe ryavuzwe," wumve neza.

Gene / Variant	Fonction.	Ibiganisha byo gukwirakwizwa bishobora kugira isano n'ΔFosB.	Ibeho neza.
DRD1 (uretseho wa dopamine D1).	D1 signaling ituma umuti PKA/CREB utanga umwandiko, kandi uwo muti utangiza umwandiko wa FOSB.	Variyante zifite ishema ryihariye zishobora kugera ku gihembero cyo gukora ibintu byinshi, bigatuma ibintu byinshi bigera ku buryo bishobora kwiyongera.	IMENDEKWE - Ibisobanuro bishoboka, bidasobanutse, kandi bidahumvikane nezireshya za ΔFosB mu bantu.
CHRNB2 rs2072661	Umwimerere wa 3' UTR mu gene y'umwinogoro wa receptor wa nicotine, uwo ufatanyije mu bushakashatsi ku bantu n'ububasha bwo kwiyegura ku miragakazi ya nicotine no guhagarara.	Bitegerezwa guhindura imikorere y'amasaha ya acetylcholine ku bwinshi bwa dopamine mu buryo bwo kugabanyiriza, bigateza imbabaro ku iyandukirizo ya ΔFosB.	INYITANGA — ibikorwa by'ubushakashatsi byagiye gukorerwa ku bantu byasuzumye ukubura kw'umwana no guhagarara, ntibyasuzumye ΔFosB by'umwihariko; ishusho ya ΔFosB ni impangaro, ntikaba igisubizo cy'ubushakashatsi.
DBH rs1541333	Ubwundi mu dopamine beta-hydroxylase, uwayobora guhindura dopamine mu norepinephrine.	Gushobora guhindura ibiranga dopamine/norepinephrine mu masoho y'ubwiza, biguhindura umwanya ukwiye kugira ngo ΔFosB itangire.	EMERGING — same caveat: the underlying study measured catecholamine tone and dependence phenotype, not

Gene / Variant	Fonction.	Ibiganisha byo gukwirakwizwa bishobora kugira isano n'ΔFosB.	Ibeho neza.
			ΔFosB directly

Tier 4 — Ibyiciro by'ubuvuzi bwo gukurikiriza imyemerero y'ubucuruzi.

Izi ni zimwe mu byiciro by'umubiri (genes) zishobora kugaragara mu bushakashatsi bw'amashyirahamwe y'amaraso (data ya raw ya 23andMe, cyangwa urundi rushimwe rugaragazwa mu bindi bisigazwa bya Recovery Kernel). Nta n'imwe muri iyi byiciro by'umubiri ituma ikintu gishobora kugira ingaruka ku bintu birimo ΔFosB. Izi byiciro by'umubiri zigaragara, rimwe cyangwa kabiri, zivuye ku bintu byaba byagira ingaruka ku bintu birimo ΔFosB.

Jeni.	Iyo ibintu byaba byagiye neza.	Ndahindura iyi link.
COMT	Ubukorera ibinyampepuro na norepinephrine, cyane mu buriri bw'ubwonko. Val/Val = ukorohereza cyane; Met/Met = ukorohereza buhoro.	Nta data y’ubuturage. Ubu buryo bwa nyuma bwa telegrafiki bushobora kugira ishusho y’ubutumikanye bw’amaraso. [UBURANGA BW’UMWANDITSI/UMUSEBENEYI]
MTHFR	Iguhaga umukagari ku myemerere y'ibinyanga (folate) no ku myubahirize (methylation) mu mubiri wose.	Ntabwo hari icyemezo cyagaragaye ku kuba hari ishusho ituma ΔFosB itakaza ubuzima. [ITARATANGWA]
OPRM1 (A118G)	Itera ku bintu by'ubushoborero bwo kwiyumburana n'umwirondoro wa opioid.	Mu byerekeye ubushobozi bwo gutanga umuti mu gihe cyo gukoresha ibintu bituma umuntu yumva uko yihumye, kandi bitarenza gukurikirana uko ΔFosB itakanga. [IMIZINGA ZITANDUKANIYE]
GABRA2	Subunit y'uretini ya GABA-A; ifatanyije n'ibyorezo byo kwiyandura ku mutojo.	Umushingorwa ushobora kugira uruhare mu kwangizwa kw'ubwonotewe (dopaminergic) biturutse ku kunywa ibinyobwa. [IMIZINGA ZITANDUKANE]
FAAH (C385A)	Igiranga anandamide; allele A yongera levelo rya endocannabinoid.	Ubwumvikanye bw'uko umuntu ashobora kugira uruhare mu kugabanya ubushake bwo gukoresha ibiyobyobyo, by'umwihariko cannabis. [IKIGENZURA]
MAOA	Ubukorera ibinyampepuro, serotonin, na norepinephrine.	Ushobora kuba umufatanyacyaha binyuze mu vuba biva mu gukorwaho k'amaamine. [UBURONDE/IKIGABANE CY'UMWANDITSI]
SLC6A4 (5-HTTLPR)	Gene y'itransporteri ya serotonin; iherukirwa n'ibikorwa by'umubiri mu byiciro byinshi by'ubushakashatsi.	Nta ibisobanuro byemejwe bigaragaza ko iyi gene ifite ishusho ku mikorere ya ΔFosB. [ITARAMENYWE]
ALDH2	Ubutunganya ibinyobwa by'alkolojini, kandi ubwoko butagira ubushoboro bwo gukora iyi nyangamvugizi butera umuntu guhinda.	Ibyo birashobora kugira ingaruka ku buryo umuntu anywa, ariko bidahindura ibintu birimo ΔFosB. [UBURONDE/UMUSHINGWA, ibintu by’ingenzi.]
CYP2D6, CYP3A4, CYP2C19, CYP1A2,	Ibirungo by'amashyirahamwe agereraho byatanga umukoresho ku buryo bw'inyuma bw'umuti kugira ngo butehere.	Hamenya ukuntu iyo nimero itembera mu mubiri, bidatanga icyo kuva mu mutwe. Ibyo byonyine bigomba kuba byakoreshejwe mu buryo butazwi.

Jeni.	Iyo ibintu byaba byagiye neza.	Ndahindura iyi link.
CYP2C9, CYP2B6		[UBURONDE/IKIGAMBO, ibintu bitazwi]
HNMT	Uvanga histamine.	Nta gahanga kigaragaza uko byakemurwa, cyangwa uko byagera ku bipimo by'umutungo (ΔFosB) cyangwa ku cyiciro cy'ubwiza. [ITARAMENWE].

Nta ikizamini cy'ubucukuzi kimwe gihagarariye kuri ubu kigomba gutanga umwimerere w'igihe umuntu umwe afite umwanya wo gukira ΔFosB. Ibyo ni byo byemeza. Ariko, icyo ni icyo gihagarariye kuri ubu ku isoko, bidatanga ikiguzi ku byo byashoboka. Inama y'ibikorwa yishyirwaho, yishyirwaho gukoresha ubushakashatsi bw'ibice by'umwimerere by'FOSB n'ibice byacyo by'ubwa kabiri (CK2, PCBP1, SMAD3, ACVR1B), amakuru y'ubushakashatsi bw'umwimerere wose, no gukurikiriza ibimenyetso by'ubuzima mu gihe umuntu atabiriye, byashobora, mu buryo, gufasha itsinda ry'abashakashatsi kugira ngo bageze hafi y'umwimerere w'ubuzima w'umuntu umwe. Nta we wigeze atangaza cyangwa yemeza ko icyo gikorwa cyo gushyira hamwe gishobora gukorwa - kandi, byibuze, bisaba imikoranire ya sisitemu z'ubushakashatsi zinyuranye. Gukorera hamwe kandi gukoresha ishyirahamwe ry'igihe kirekire, bidatanga ibintu byose mu kit. Ibyo ni ikibazo cyo gushaka ibikoresho no kwemeza, bidatanga icyo kintu nk'amategeko. Umuntu ufite ibikoresho byimbitse, amafaranga, n'ubushake, yashobora kugira uwo mushinga.

7. Ibyibazo by'ADN n'iby'Epigenetiki — Ibyo Ushobora Kugira Ubu.

Ibyiciro by'ubuvuzi bwa kimwe (SNP Arrays)

Ubu bushakashatsi bwo gukurikiriza amagene y'abantu (bwo mu buryo nk'ubwo 23andMe, cyangwa urundi rushakashatsi ruri muri iyi porogaramu) dusoma ibice by'umugene bifite ibimenyetso by'umutuzo (single-nucleotide positions) byasobanutse, harimo ibice by'umugene bya 3 na 4 mu ma tabeli ari hejuru. Ntabwo dusoma neza umugene wa FOSB kugira ngo dusangire ibimenyetso bisanzwe cyangwa bidasanzwe, kandi ntabwo twashobora kumenya ibimenyetso byatowe (engineered) bya 1, kuko bidashoborwa mu muntu. Ibi bishobora kuba byifashishijwe mu bice by'umugene byasobanutse, ariko ntibyatangiwe kugira ngo dusubire kuri iyi ibibazo byumvikanye.

Whole-Genome Bisulfite Sequencing (WGBS)

[KUBUKA] uko byakozwe muri iyi ibibazo byumvikanwa.

WGBS ni umwanzuro wo gushushura (sequencing) ushyira hamwe iyo ushobora kumenya uko DNA itunganyijwe (methylation) ku buryo buhagije, kandi buri mu byiciro by'ibimenyistezo (epigenetic marking), aho ushobora gushushura gusa ibimenyistezo bimwe byatangiye. Uburyo bwo gushushura buhagaze neza (bwohereweho nk'uko "WGBS 30x" byari byatangajwe, bituma ushobora kumenya ibimenyistezo byinshi) bitanga ibimenyistezo by'ubushushuru byinshi, kandi by'umweru, kandi byatanga ibimenyistezo by'umweru. Sequencing.com muri iyi minsi yashyize ku rubuga rwayo umushinga wa WGBS-30x, kandi uyu mushinga ni umwe mu bwayo utanga ibimenyistezo by'umweru ku buntu butoya, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru ku buryo buhagaze, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo

buhagaze, aho ushobora kugera kuri iyi data y'ubushushuru, kandi ugeraho mu buryo

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Ibyo ushobora kuvuga: imyirondoro y'uburyo ibinyomvyi bishyirwaho (methylation) ni umugongo w'ubushakashatsi bw' "epigenetic clock" (gushobora kwereka imyaka y'umuntu ku binyomvyi mu maraso). Uburyo bwinshi bw'imyaka butuma imyirondoro y'uburyo ibinyomvyi bishyirwaho mu maraso.

Ibyo utashobora kuvuga: nta bimenyetso byemejwe kandi byasomwa mu bushakashatsi, birashobora kureba uburyo bwinshi bw'ubuganda bwa FosB - uburyo bwo guhindura ibinyomvyi bishushanyijwe mu Icyici cya 4 - mu maraso cyangwa mu mavuta. Uwo guhindura ibinyomvyi bishushanyijwe uraba mu ma neuron yo mu gice cyitwa nucleus accumbens, kandi atari ahantu hashoborwa gukoreshwa mu muntu w'umuntu. Ibigo by'ubushakashatsi bw'uburyo bwinshi bw'ubuganda bwa ibinyomvyi bishyirwaho (WGBS) ni byo bitanga amabiko y'uburyo bwinshi bw'ubuganda bwa ibinyomvyi bishyirwaho, ariko ntibishobora guhinduka. ubushakashatsi bw'umwimerere y'umuntu ku byiciro by'umutungo wa ΔFosB, nubwo ama data ari meze neza.

WGBS ifite agaciro nk'ibimenyetso gisanzwe ku wari muri we ushaka kwubaka isano ndende kandi itera imbere y'ubuzima bwe - kandi ni kimwe mu bice bice by'ibindi ushobora kubona. Gusa, ntukunde kwitega ko raporo y'uyu munsi itagutanga umubare "ubwo bwaha bugiye gutangira kugira ngo ΔFosB yongere yongere". Uwo mushinga wo gushyira hamwe no kumenyesha ibimenyetso atarashyirwaho, kandi ntawe ufite, ntawe ushobora kubona, ntahererezo.

8. Gukoresha Imiti Ebyiri cyangwa Zinyinshi no Kugira Ibihe By'Ubwiza Byumvikana.

[UBURANZI/UBUSHOBORWE BWA UMUSHAKAMIZI] n'ibimenyetso by'ubumenyi n'ibimenyesha by'ibyibereye mu buvuzi.

Abantu bagerayo guhuza imiryango nyuma yo gukoresha imiryango y'ibiyobyobye bamenyeshwa buri gihe ko bafata igihe kinini kandi ko inzira yo kugaruka ku buzima busanzwe iba iteye ishasha kurusha abandi mu buryo bwo gukora ibikorwa byo guhuza imiryango (Recovery Kernel). Hari impamvu zigaragazwa ku rwego rwa molekuli zishobora kugira ishingiro kandi zigaragaza ibyabaye mu buzima busanzwe.

- Induction y'ibintu by'umwiharuro. Ibiranga byinshi mu itabari ya Kaburane ya 2 birashobora kugera ku bintu byitwa ΔFosB binyuze mu nzira imwe, iy'ubutumwa bw'amashyoka (dopamine) bigera mu gice cyitwa nucleus accumbens, kandi bitewe n'ibintu bitandukanye (DAT blockade, mu-opioid activation, GABA-A potentiation, n'ibindi). Gukoresha zimwe muri izi zirahari mu gihe gito ntibivanga, ahubwo bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi bishobora kugera ku bintu byitwa ΔFosB, kandi bigera ku bintu byo mu buryo bumwe, kandi bigabanya ibintu byitwa ΔFosB. Ibi

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- Ubuvumbuzi bwo guhindura imyumbo y'amaseli (chromatin remodeling). Ibirungo bitandukanye bidatanga ibintu by'ibanze by'amaseli (target genes) bifananye nyuma y'ibintu bituma ibice by'ubwonotewe byagira ingaruka (ΔFosB). Imiruno, imiti itanga

ububabare, n'inzoga, buri ndege ifite ibimenyetso byayo bwite byagaragazwe mu bushakashatsi ku byo gutanga ububabare. Gukoresha imiruno itandukanye bigira icyo bihuriyeho, bishobora gutuma guhinduka kw'imyumbo y'amaseli (chromatin remodeling) (Umudugudu wa 4) ku bintu byinshi, ku bice bitandukanye, kandi bishobora kuba ikibazo gikomeye cyane, bidatanga umuti w'ibintu byo gusa.

- Ibyavuzweho mu bushakashatsi ku byo gukira. Ndetse n'uburyo ibintu byagenda, gufata ibiyobyobyo byinshi by'umwiharuro bishobora gutuma umuntu atagira amahirwe yo gukira, kugira amahirwe make yo gukira, kandi kugira ibibazo byo mu buzima byinshi kurusha uwakoresheje umwiharuro umwe. Ibi bivuze ko mu bushakashatsi, abantu bakoresha ibiyobyobyo byinshi bagira ibibazo byinshi kurusha abakoresha umwiharuro umwe. Ibi bintu ni byo byemejweho kandi bishoborwa n'ibimenyetso, kandi bidatanga ibisubizo ku byo guhindura ibintu ku rwego rwo mu maro.

Buri gihe, kwivura inyanduranyo z'imiti zirenze imwe si ikintu kitakiza - umushinga wa
"Recovery Kernel" urimo ushyiriraho kugira ngo ushyireho inkunga ku bantu bafite ibibazo
by'ibanze. Ibi bisobanura ko igihe umuntu yari kuvirwa, igihe cyo gukira gishobora kugenda
neza cyane, kandi ko igihe cyo gukira gishobora kugenda neza cyane, kandi ko igihe cyo
gukira gishobora kugenda neza cyane, kandi ko igihe cyo gukira gishobora kugenda neza
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Ibyavuye ku bushakashatsi - Umushinga wa "Chemsex Trinity" (Meth, Cathinones, GHB)

"Chemsex" (gukoresha imiti mu by'ibyo gukorera) - cyane cyane methamphetamine, imiti ituruka ku miringo nk'iyo itwa "mephedrone" ("cat"), na GHB/GBL, kandi ahandi hari igihe hakongerwa MDMA cyangwa ketamine - ni imiti ituma abantu bagira ibibazo byo kuyivamo, kandi abantu bayikoresha n'abita ku kuvura abantu bayikoresha bavuga ko ari icyiciro cy'imiti cyumvikana cyane. Ibyo bituma abantu bayikoresha bavumwa. Iyi gahunda y'ubumenyi y'ibintu by'inyamaswa yifashisha ibitekerezo by'ibimenyiste kugira ngo dusobanure ibintu bimwe by'impamvu, ariko si byose.

Imiti.	ΔFosB Induction (kuva mu Icyiciro cya 2)	Uruhwari mu Gatatu.
Methamphetamine	Cyinshi cyane.	Ubwumena bukomeye bw'umushinga umwe mu byuma byombi - guhindura ibintu byitwa DAT/NET bituma umushinga wa dopamine ukomera, bidatanga gusa umugambi wo kwirinda kwongera umushinga, ahubwo bituma umushinga wa dopamine ukomera.
Mephedrone / cathinones ("cat")	High.	Igihe gito cy'ubuzima bwa kimwe cya ngabire bituma bisanzwe bisubirwa buri kanya mu gihe cy'umunota, kandi ibyo byo bigira uruhare runini mu kugera ku byo ushaka.
GHB / GBL	Nini - Buhanga bukeya.	Umushingorwa muke wa ΔFosB, ku gice cy'ibindi, ufite uruhare, ariko uruhare rwe mu byo bituma gukurikira ni ikibazo cy'inyifasi (physical dependence) cyubahwe, bidatanga umuti ku byo gutanga ibyishimiro.

Muri buri rugero, imwe muri iyi mitokomoko itatu gusa ni imyemerere ikomeye y'ΔFosB. Ibyo bituma uburyo bw'ibindi bitumvikane si uko buri kimwe kivuga icyo kimwe, ahubwo ni uko ibintu bitandukanye byatuma umuntu akomera cyane, kandi byose bigenda hamwe mu gihe kimwe:

- Convergence y'ubutekereza bwo gushimira (Ingingo ya 8) — meth na mephedrone zishimira ibiphariki by'ubutekereza bwo gushimira bigereranywa mu gihe, ahubwo bigereranywa.

[YEMWE] Imibonano yihariye ni icyiciro cy'ibintu gituma ΔFosB ihinduka, kitarenze igihe cy'imibonano. Ibihanga byakozwe ku mbyoni (Pitchers et al., 2010, guveranwe n'itsinda ry'abakozi yari yarashinze uburyo bw'ibanze bwo guhindura ΔFosB) byagaragaje ko imibonano yenyine ituma ΔFosB ihinduka mu mawe ya nucleus accumbens, VTA, na prefrontal cortex — kandi, cyane cyane, ko imibonano yongera ubushake bw'imbyoni ku mananga. Ibi bice byombi byongerera umusaruro bidatanga ibindi; hari ibimenyetso byigaragaza ko bifatanyije bigatuma umusaruro w'ibintu bitatu ugorana.

- Umushingira w'amafoto ushyiraho umwanzuro uhindura umwanzuro umwe ufatwa mu majwi yo mu butumwa. Ibi biruhuko byo gukora imibonera byoroshye bishobora gutwara amasaha menshi cyangwa iminsi, kandi bigizwe no gukoresha ibintu byinshi uko uko byagenda, kandi ukurya gato. kandi, Umwirongo wa 12 yagaragaje ko ukurya gato bishobora kugira ingaruka ku buryo ibintu byakemurwa. Muri rusange, uburyo bwo gukora iyi mikorere ni nk'uburyo bw'ibintu byinshi by'ingeso z'ubwa kera, bigenda byose hamwe, kandi bigenda byihutishijwa.

GHB/GBL ifite ingorane zikomeye kandi zidakoranye na ΔFosB: guhungira bishobora kugaragara mu minsi mike yo gufata buri gihe, kandi uburemere bwo guhagarika gufata bishobora kuba nk'ubwo wa alkolojini na benzodiazepines. Bishobora gutera ubwoba, uruvange, n'ibindi biza bishobora kuregera umuntu mu buryo buvugisha gukoresha serivisi z'ubuvuzi. Kuguhagarika gufata GHB/GBL buri gihe kandi utwibasiwe n'abaganga ni ibintu by'umwihariko. Ibi ni nk'uburyo bw'ingenzi umuti usobanura ku byo gufata alkolojini utangiraho.

Ku ngingo z'ibisubizo: Ibyandiko bya kliniki ku gukoresha methamphetamin kuri benshi abakoresha imiti mu buryo bwo gukora imibonera (chemsex) byagaragaje ko hari ibyago byinshi byo gufata uburare, gufata ubwoba, gufata ibimenyetso by'agahinda (PTSD), no gufata ibimenyetso by'ubukuntu (psychosis) ugereranyije n'abantu ba benshi, kandi ibyo byagera ku byo kuba umuntu yiyuze kuva ku mugero kugeza ku mugero. Ibyakorwa ku miti ya GHB/GBL byagaragaje ko gukoresha imiti menshi mu gihe kimwe no gukoresha imiti byinshi ari byo byatumye abantu batagira ubushake bwo gukomeza gukorwa. Ibyo ni byo, ariko bidatanga icyo hagomba kuba, kuko hari ibimenyetso by'ubuzima byanditswe mu buryo bw'umusobanuro ku byo gukoresha imiti no ku byo kugira ibisubizo.

10. Iminyigo y'ibiyobyobye, "Gusubira izero," kandi kuki guhagarara kwa ntiruhagararaho.

Iyi ni imwe mu ngingo z'ingenzi cyane muri iyi gahanda, kuko ivuga ibintu by'ingenzi by'abantu benshi bari mu byiringiro byo kwivura, ariko by'abantu bake cyane babihuriweho: umwanzuro wo guhagarika, "umwanya wo guhagarika," "ukwezi kw'inyanga," cyangwa "inyigo yo gushyira mu mwanya," ukurikijwe no kugaruka ku gukoresha, kandi ubuvumbuzi bugaruka vuba cyane, nk'aho nta ntagatifu yagiye itangira. Bugaruka vuba, nk'aho umwaka utari wagiye utangira.

[INYITIMBO] (ihereye ku mwanya w'ubushakashatsi w'uburyo bwo guhindura imyimerere y'ama cellule (chromatin) usanzweho mu bisigazwa 4, kandi ikoreshwagwe mu gushyira ibintu ku mwenda (reinstatement) - uburyo bwa nyabubasha mu bushakashatsi bw'uburyo bw'inyandiko ku by'ibintu by'inyamaswa.)

Hari ibintu byumvikana: umwanya wo gukora ibindi ntibimubangikanye, bishobora gufasha umushinga wa ΔFosB kugira ngo ubeho gato – uwo mushinga ushobora guhinduka, kandi ni wo mushinga ushobora kugaragazwa mu gihe cy'umwanya ushobora kurekurwa, nk'uko bitangazwa mu bisigaye. Ariko, icyo Section 4 yagaragazaga ni icyo umushinga wa protein

yashize inyuma: chromatin yagombwa gukorwaho ku byiciro by'ibindi bintu (byataye c-fos kubera HDAC1, byatangiye CDK5/GluA2/ARC kubera BRG1), kandi byinshi byagombwaga gukorwaho ku buryo bwa fiziki ku bice by'amahembe by'amahembe y'amahembe y'ibindi bintu by'ubwonotewe byakoreshwaga. Ibyo byose ntibishobora kugaruka mu gihe kimwe n'umushinga wa protein. Akarorero k'ibintu ntikagera ku mwimerere yariho mbere y'ubuzima bwa nyinshi, kuko umushinga wa ΔFosB. yacyuye - ni ikiraro cyuzuye cyumvikanye, ariko kigaragaza ko kiriho.

Igihe umuntu yongera gukoresha ibiyobyobye, ntibihindura ΔFosB mu buryo bushya mu ishami ry'ubwonotewe nk'uko byari byagenze ubwa mbere. Ahubwo, birongera guhindura ΔFosB mu ishami ry'ubwonotewe ririmo umubare w'amafirime, ubushobozi bwo kwakira, n'ubushobozi bwo guhindura isesema, byose byari amaze kugeraho mbere – ibintu byakozwe rimwe kandi ntibigeze byandikirwa burundu. Kugeraho umubare wa ΔFosB utazongera guhinduka mu ishami ry'ubwonotewe ririmo ibintu byakozwe, byakenera gukoreshwa inshuro nyinshi, kuko ibintu byinshi byo gukora mu buryo bwa burundu byari amaze kugeraho. Ibi bishobora kuganira n'uburyo bw'inyandiko bw'inyongera y'ibiyobyobye mu byakorwa ku bipapuro by'inyamaswa, mu byo kwirekura, aho umuntu yongera gukoresha ibiyobyobye. Ubwoko bumwe bw'ubusumbuje, nyuma yo guhagarika, bushobora kurenga ubushake bwo gufata ibiyobyobye cyane kurushaho uko byakajyanye n'ubusumbuje bw'umwimerere - kandi ni icyo bushakashatsi bufite ubushoborero bwinshi ku byo abantu bavuga ko "Ntabwo nagiye kurenga, ntabwo nagiye kuyobya, kandi ntabwo nshobora kumenyesha impamvu byabaye vuba."

Ibyo bifite ingaruka nyakajaga ni uko kutivanga biratanga umusaruro, kuko kugabanyiriza igihe cyo gukora ibintu bituma bigenda neza, kandi buri gihe umwanya uhinduka (ΔFosB) bigenda bigabanuka, kandi uwo ubushake ni impinduka nyakajaga. Ibyo bisobanura ko umwanya wo guhagarika ntukwiye kwiteganyirizwa cyangwa ukwiye kwemezwa nk'uko uva ku byiciro byose. Umwanya urushaho kwibuka ibintu byinshi kuruta iby'amashyirahamwe, kandi kurenga umwanya wo guhagarika hanyuma ukomeze gukora ibyo byo, bigenda bigaragaza ko ugiye gukomeza aho wari ushoboraga, aho gutangira icyamamaro.

11. Ubushake bw'imikoro ya cellule no kurwanya intambara mu bwonka.

[IMAZIYO YAHOYE] (imibare y'inyamaswa; ubu buryo bishoboka ariko butaragera ku mwiyongera nk'aho biri mu ibarika 1-4)

ΔFosB ifite uruhare rurenze ibikorwa by'ubuzima bwa ruswa, kugeza ku myemerere y'ubugogosi no gukora neza mu buvuzi. Nk'umwe mu bice by'umuryango wa AP-1 (uzwiho gukorana cyane na JunD), urimo mu byiciro by'imikorere byerekeye ubugogosi bw'igice cy'umuhuza - uburyo umuhuza utangira kwihorera kandi wigaragaza imikorere itandukanye, kandi isanzwe irebana n'ibintu by'inyifasi.

- Mu neuron z'umuntu z'imyaka, z'ibindi bice ziba zitazongera, umutuzo ukomeye cyangwa ububabaro bwinshi bw'umusebe (excitotoxicity) bushobora gutuma izi cellule ziba mu rwego runyuranye, bitwa "stress-induced premature senescence" (SIPS). Ibyo bintu by'umwimerere bishobora gutuma ΔFosB ikora buri kanya, ndetse n'ibindi bintu bifatanyije (EGR3), kandi byaba byitezwe no kuba hari ibindi bintu byinshi by'ibindi bintu by'umwimerere (DNA-damage-response genes) bifatwa (GADD45B/G) na p21 (CDKN1A), kandi mu buryo bukomeye, byaba byatuma ibindi bintu by'umusebe byagera ku rwego rw'ibintu by'umwimerere, kandi byatuma ibindi bintu by'umusebe byagera ku rwego rwo gutanga amabwiriza (synaptic plasticity) kandi byatuma ibindi bintu by'umusebe byagera ku rwego rwo gukora (hippocampal neurogenesis).

- Mu maseli atazigize (astrocytes na microglia), ubuziranenge bugeze ku gihe bukazana (sustained) bwa AP-1 buhuriwe n'ibintu by'ibikorwa by'amaseli agiye kugira ubwo bugeze ku gihe (Senescence-Associated Secretory Phenotype - SASP): amaseli y'amakungwa agiye kugira ubwo bugeze ku gihe agashyira ibimenyetso by'inyangamugayo (inflammatory signaling molecules) zishobora kugera ku maseli andi, bigatuma hagaragazwa ibyorezo by'inyangamugayo mu bice by'ubwonko. Uburyo bwo gushyira ibimenyetso by'amaraso mu bwonko (CRF, glucocorticoids) bishobora gushyira inyota kuri uwo murongo.
- Ubwumwe ntibubera umuhingo mu buryo bumwe – ibihe na poroteyi z'ubwonko bifite icyo bigaragaza. Mu hypothalamus, umwiharuro w'umushinga wa ΔFosB uhusubirwa n'imikundano yo gukora ibintu byiza mu myinota y'inyamaswa zituronzwe (kwihangana neza n'isukari, kugabanyiriza ingano y'ibintu byinshi bitera). Mu myeresi runaka y'ibyorezo by'umutwaro no guhagarara, umwiharuro w'umushinga wa ΔFosB mu hippocampus uragaragaza ko uhashobora kugabanya urujijo rw'amaseli, kandi kandi urangiza n'uburyo bumwe bw'ubumwe – ni ukubanza gukora ibintu byiza, ntibyo bigaragaze umuhingo.

Iyi ngingo yishyizwe kugira ngo hagereho kandi kuko ari intyigiri yo mu byakorwa by'ubushakashatsi ku izingoma zinyuranye z'iyo molecule - si kuko byihuje n'ibindi bisigaye mu bisigaye mu ngingo z'amaporo yo guhagarika. Ni umutwe mushya, utarahamwe neza, kudasigaye mu ngingo zombi za mbere na 4, zirebana n'uburyo umuntu yitwara.

12. Ibyo byaba byifashishije - Binyuzwe n'ubushakashatsi bumwe.

- Kwihagarika burundu - ni icyiciro gikomeye cyane, kandi ni icyo gishobora gukuraho ibintu byinshi cyane, kandi ni byo byonyine byatuma ibintu bidafata mu gihe kirekire.

[YAKOMEJE] Imyito y'ubuzima itangwa buri gihe ituma harebwa ΔFosB mu gice cyitwa "nucleus accumbens" - kandi bikorwa mu buryo butandukanye n'ubwo ibiyobyobyo bikoresha, uburyo buterimbwa n'ibintu bituma umuntu kwihangana kandi atagomba gushaka ibiyobyobyo, aho kugira uburyo butuma umuntu gukora ibintu bibi. Iyo poroteyini, igihagarurwa mu buryo butandukanye, ishobora kugira icyo itanga mu kurwanya uwo mwihari, aho kugira icyo itanga mu kugira ngo umuntu wihari.

- Kuruhuka - Kugororera kwe proteasome kunyura ku kuruhuka neza; ukuruhuka buhoro buhoro ni icyiciro cyatuma ibintu atagende neza (ntihagere ibimenyetso).
- Kwivura guhumeka - Umurimo wa stress, ku byo byihariye, wihutisha ubwinshi bwo gufata ΔFosB, binyuze mu ishusho ya HPA, kandi bikongera ku byo umushinga wa substance uhindura.
- Igihe, mu buryo butaboneye - inyandiko zivuga ku gihe (inyandiko zivuga ku "phase ya structural-persistence") zivuga ko zigira iminsi myinshi cyangwa amezi, bidatanga iminsi make. Kwitega ko igihe cy'ibyuminsi bibiri ari byo byose bituma umuntu yongera gukoresha ibiyobyobye mu buryo budasobanutse igihe ibyo byohererezo byagarutse, kandi kubera impamvu z'ubuzima bw'umuntu. Kuko bivugwa mu Icyiciro cya 10, kwinyura mu byohererezo kuri uwo mwanya bitangira ku bipimo byari bimeze neza, bidatanga amahirwe.

Ibiganiro.

ΔFosB yisobanura, mu buryo bwa kimyaka, impamvu ituma umwanda ukomeza kugereranya umuntu, kenshi nyuma y'igihe umuntu yagize impamvu z'inyandiko z'inyongera y'uko agomba guhagarika – kandi kuki umwanzuro wo guhagarika, nubwo utanga amahirwe, atari uko umuntu yagarutse aho yari. Iyi ntangazo si icyo gituma byose, kandi ntikwemeza neza mu

muntu w'umuntu n'ubushake bw'abantu, kandi nta byemezo byo kuri uru rwego rwa noneho rwafasha umuntu kwemeza igihe cyaje. Iyongereho, yifashishijwe nk'ibindi bice byo mu murongo w'ubugenge bwo guhuza, nk'umwe mu byiciro by'ubugenge by'ukuri, by'imigenderanire, nt'ukibwira ko ari byo byose. nkingiro.

Ibindi bitabo byo mu rurimi rw'Ikinyarwanda:
**Uburyo bwo kwirinda ubuzima bwo kunywa inzoga.*
**Uburyo bwo kwirinda ubuzima bwo gukora cocaine.*
**Uburyo bwo kwirinda ubuzima bwo gukora crack cocaine.*
**Ibyavandanye byose (Voliyumu ya III - Imikoresherezo y'imibereho n'ibihindagurura ibimenyana, kandi Voliyumu ya I - Inyandiko y'ibanze n'ubumenyi bw'ubuzima).*